

Dol Net Fishery off Nawabunder (Gujarat)

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Estimated catch of 6,484.9; 3,505.6 and 4,797.7 t of fishes were landed at Nawabunder in 'dol' net during 1976-77, 1977-78 and 1978-1979 respectively. There has been an increasing trend in effort and decline in catch and catch rate. The catch rate came down from 174.8 kg in 1976-77 to 84 kg in 1978-79. The detailed studies on the catch composition revealed that the Bombay duck formed about 68.6-77% of the total catch. The other important constituents being *Coilia dussumieri* 1.5-9.2%, ribbon fish 3.0-6.5%, non-penaeid prawn, namely, *Acetus indicus*, *Nematopalaemon tenuipes* and *Hippolyssmata ensirostris* together formed about 6.1-13.7% and penaeid prawns 1.5-3.1% of the total 'dol' net landings. In addition, quality fishes such as 'ghol', 'wam', pomfret and catfishes were also landed in considerable quantities. The landings of 'ghol' is on the increase from 4.9 t in 1976-77 to 59 t in 1978-79. Large number of juveniles of economically important fishes namely, *Harpodon nehereus*, *Pampus argenteus*, *Trichiurus lepturus* and *Ilisha filigera* have been observed in the catch particularly during February-May. The destructive nature of the gear has been commented along with the suggestions for regulation of the fishery.

The 'dol' net is one of the most important gear used in strong tidal current along the coasts of Maharashtra and Gujarat. The Bombay duck, *Harpodon nehereus* (Ham) is the main constituent of the catch so much that the 'dol' net fishery has become synonymous with Bombay duck fishery. However, a detailed catch composition revealed that Bombay duck forms 68.6-77% of the total 'dol' net landings along the Saurashtra coast.

Though a number of workers have studied Bombay duck fishery (Nair, 1970; Prasad, 1971; Banerji, 1973; Bapat & Alawani, 1973 and Nair & Balakrishnan, 1975) but no effort was made to study the catch composition of other constituents of the 'dol' net landings except for a brief account by Pillay (1948a). The present communication is based on the data collected from Nawabunder (one of the three major fishing centres along the Saurashtra coast) during 1976-77 to 1978-79 fishing seasons.

Fishing effort

The fishing effort along with catch composition is given in Tables 2, 3 & 4 for the fishing season 1976-77, 1977-78 and 1978-79 respectively. Estimated 37,108, 43,840 and 56,972 hauls were made during 1976-77, 1977-78 and 1978-79 fishing seasons respectively. The fishing season begins during the second fortnight of September and continues upto the end of May with peak fishing activities during October-January and March-April.

Catch composition

An estimated catch of 6,484.9 t of fish landed at Nawabunder during 1976-77 at a catch rate of 174.8 kg. During the subsequent two fishing seasons both the catch and catch rate came down. The percentage composition of various constituents of 'dol' net landings are given in Table 1. The seasonal abundance of the species is given in Fig. 1.

Table 1. Percentage composition of dol landings

	76-77	77-78	78-79
<i>Harpodon nehereus</i>	72.5	76.8	68.6
<i>Coilia dussumieri</i>	1.5	3.5	9.2
<i>Ilisha filigera</i>	0.3	0.3	-
<i>Trichiurus sp.</i>	3.7	6.5	3.0
<i>Muraenesox talabonoides</i>	3.0	0.2	-
<i>Pseudosciaena diacanthus</i>	-	0.5	1.2
<i>Pampus argenteus</i>	0.4	0.3	-
<i>Sciaenids</i>	0.6	0.3	0.3
<i>Acetes indicus</i>	6.2	2.2	5.6
<i>Nematopalaemon tenuipes</i>	4.4	2.5	4.9
<i>Hippolysmata ensirostris</i>	2.1	1.4	3.1
<i>Solenocera crassicornis</i>	1.7	1.3	1.2
<i>Other penaeids</i>	2.5	1.5	0.3
<i>Miscellaneous fishes</i>	1.0	2.9	1.8

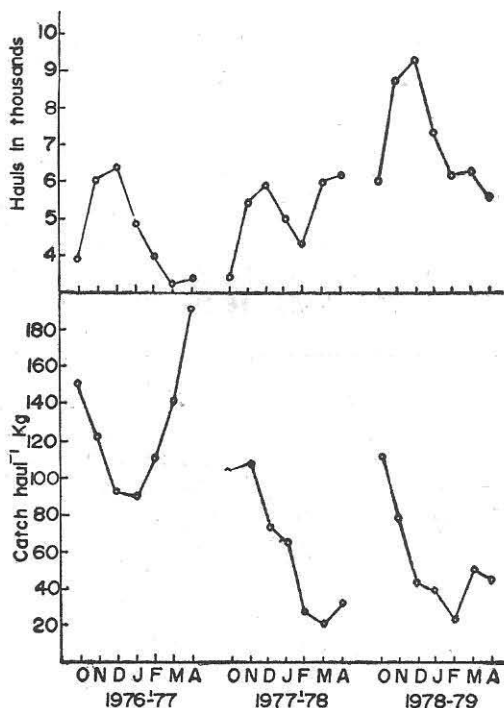


Fig. 1. The seasonal abundance of dol at Nawabunder from 1976-1979.

Bombay duck

An estimated catch of 4700.4 t of Bombay duck, *Harpodon nehereus* was landed during 1976-77 at a catch rate of 126.6 kg. During

the subsequent two seasons, there was decline in abundance, 2,690.6 t and 3,291.6 t were landed during 1977-78 and 1978-79 respectively at the catch rate of 61.37 kg and 57.78 kg. The peak landings were recorded during October-December. The Bombay duck formed about 68.6 to 76.8% of the total 'dol' net landings.

The catch rate varied between 8 kg (January, 1979) to 261 kg (May, 1977). However, when the data on catch rate and effort were subjected to time series analysis (Fig. 1) it indicated that as the season advanced the catch per haul decreased and again after March it increased. It is also evident from the graph that there is an increasing trend towards effort and declining trend in catch rate of Bombay duck.

The minimum size of Bombay duck recorded was 22 mm and maximum 345 mm.

Clupeids

This group includes *Coilia dussumieri*, *Ilisha filigera*, *Engraulis*, spp. *Anchoviella* spp. and *Dussumieria acuta*, the former two being the most important constituents and others are highly seasonal.

As it is evident from the catch data the catch of *C. dussumieri* is on the increase from 97.4 t in 1976-77 to 443.5 t in 1978-79 which constituted about 1.5 to 9.2% of the total 'dol' net landings. The catch rate being 2.6, 2.8 and 7.8 kg respectively. The catch rate varied between 0.1 kg (September, 1976) to 29.2 kg (March, 1979). The peak period of abundance being January-April. The size ranged between 60-190 mm.

An estimated 10.8-19.5 t of *I. filigera* were landed during the years at the catch rate of about 0.2 to 0.5 kg forming 0.2 to 0.3% of the 'dol' net landings. October-December and April-May appears to be the peak periods of abundance. The size ranged from 48 to 350 mm.

Ribbon fish

It formed about 3-6.5% of the catch. The main constituents are *Trichiurus lepturus* and *Eupleurogrammus muticus*. There is a decline in ribbon fish landings from 239.7 t in 1976-77 to 145 t in 1978-79. The catch

Table 2. Catch composition of 'dol' net landings at Nawabunder during 1976-77

	Septem- ber	Octo- ber	Nove- mber	Dece- mber	Janu- ary	Febru- ary	March	April	May	Total
Estimated effort (No. of haul)	759	5340	6072	6900	6342	1440	4056	4160	2039	37108
Catch in kg	146545	1549314	987183	1108982	456150	177200	743274	760240	556020	6484907
Catch per effort in kg	193.1	290	192.6	160.7	71.9	123.1	183.3	182.8	272.7	174.8
Fish:										
<i>H. nehereus</i>	128775	790200	726528	688400	384750	164200	641640	643400	532590	4700483
<i>C. dussumeiri</i>	120	14808	22293	14688	2502	4040	24450	13108	1342	97351
<i>I. filigera</i>	—	7842	7902	1692	900	1160	—	—	134	19496
Other clupeids	—	—	—	—	—	—	—	—	—	—
<i>Trichiurus</i> spp	120	99252	39312	69936	11058	780	6558	12720	—	239736
<i>P. diacanthus</i>	—	—	3612	—	—	—	1260	—	—	4872
<i>M. telabonoides</i>	—	176412	—	17052	—	—	—	—	—	193464
<i>P. argenteus</i>	2427	2418	666	6600	—	1100	5400	3800	—	22545
Elasmobranchs	1750	7806	1944	—	—	—	—	—	—	11500
<i>Tachysurus</i> spp	—	3186	2250	3240	—	—	—	—	—	8676
Sciaenids	995	16956	3846	2808	1590	300	3894	7300	503	38192
Prawn:										
<i>A. indicus</i>	—	324324	71694	—	—	1300	—	1200	—	398518
<i>N. tenuipes</i>	—	—	28044	217944	31320	40	6630	1160	—	285138
<i>H. ensirostris</i>	5840	19620	58086	49830	—	—	—	—	67	133443
<i>S. crassicornis</i>	—	23850	2214	4590	—	100	16260	46832	11455	105301
Other penaeids	2843	52290	117000	22056	15390	2880	29316	24000	355	160810
Miscellaneous	3675	10350	7092	10146	8640	1300	7866	6720	9593	65382

rate also showed a decline (6.45 to 2.5 kg). The catch and catch rate indicated higher abundance of ribbon fish during October–November and May. Though the peak periods of abundance of Bombay duck and *Trichiurus* spp. is same it has been observed that when the catch of *Trichiurus* spp is very high in a particular unit, the Bombay duck catch is usually very less and at times stray. This suggests that the Bombay duck avoids the area of ribbon fish abundance.

Quality fish

The catch of 'Ghol', *Pseudosciaena diacanthus* is on the increase from 4.872 t in 1976 to 59 t forming about 1.2% of the 'dol' net landings in 1978–79. The peak period of abundance being January–April. The size ranged between 125 mm–1004 mm.

An estimated catch of 193.5 t of 'Wam' *Muraenesox telabonoide* was landed during 1976–77 out of which 176.4 t was landed at the catch rate of 33 kg alone in the month of October. The size ranged between 435 mm and 2220 mm. During the subsequent two seasons the catch was poor. It appears that the shoals of this species approaches the inshore region off Nawabunder for a short duration and then move away.

An estimated 8.7 and 2.6 t of catfish, *Tachysurus* spp were landed during 1976–77 and 1978–79 respectively. The landing is highly seasonal and the fishermen tie old pieces of gill-net on the cod of 'dol' net when catfishes are in abundance.

An estimated catch of 22.5 t of silver pomfret, *Pampus argenteus* (Eupher) was landed at the catch rate of 0.6 kg during 1976–77.

Table 3. Catch composition of 'dol' net landings at Nawabunder during 1977-78

	Septem- ber	Octo- ber	Novem- ber	Dece- mber	Janu- ary	Feb- ruary	March	April	May	Total
Estimated effort (No. of haul)	784	4232	5334	6880	5684	2346	5183	10325	3070	43840
Catch in kg	116655	718447	422422	971976	425020	120984	139450	286540	304123	3505617
Catch per effort in kg	148.8	169.8	79.2	141.3	74.8	51.6	26.9	27.8	99.1	80.00
Fish:										
<i>H. nehereus</i>	93800	585023	300180	291600	228280	67760	82200	230750	211005	2690600
<i>C. dussumieri</i>	1267	3582	1482	7680	74170	14982	8910	3850	6058	121981
<i>I. filigera</i>	—	3558	4356	2720	12	156	—	1000	—	11802
Other clupeids	—	—	—	—	—	—	—	—	—	—
<i>Trichiurus</i> spp	2233	22992	49722	4240	53440	11984	7340	7750	66972	226673
<i>P. diacanthus</i>	84	—	—	—	11680	—	6110	—	—	27874
<i>M. telabonoide</i>	644	512	3960	—	—	—	—	—	—	5116
<i>P. argenteus</i>	2345	5696	2202	—	—	78	—	—	1598	11919
Elasmobranchs	294	—	647	—	—	—	—	—	—	941
<i>Tachysurus</i> spp	—	—	—	—	—	—	—	—	—	—
Sciaenids	1897	2924	1416	—	—	1949	—	690	—	8876
Prawn:										
<i>A. indicus</i>	—	16226	25441	—	—	7374	17145	7870	2602	76659
<i>N. tenuipes</i>	—	—	—	36720	30400	6790	—	9730	3233	86873
<i>H. ensirostris</i>	7861	6516	5585	18416	1490	—	1275	4225	4367	49735
<i>S. crassicornis</i>	—	20485	15396	—	—	—	2260	5060	1115	44316
Other penaeids	1701	32249	647	—	6682	3971	3056	2255	297	50857
Miscellaneous	4529	18682	11388	10600	18866	5939	11155	13360	6876	101395

During subsequent two seasons 12 t and 6.9 t were landed at the catch rate of 0.3 and 0.1 kg respectively. The peak period of landings appears to be in September–November and March–April. The size range of *P. argenteus* ranged between 20–309 mm.

Non-penaeid prawns

This group includes *Acetus indicus*, *Nematapalaemon tenuipes* and *Hippolyasmata ensirostris*.

An estimated catch of 398.5t of *A. indicus* was landed during 1976–77 at the catch rate of 10.7 kg. During 1977–78 fishing season only 76.7 t were landed, the catch rate being 1.7 kg. The landings of *A. indicus* improved during 1978–79 fishing season and 280.8 t were landed at the catch rate of

4.7kg. There were two peaks of abundance i. e., October–November and January–March, and formed about 2.2 to 6.2% of the 'dol' net catch.

An estimated 285.1 t of *N. tenuipes* were landed during 1976–77 at the catch rate of 7.7 kg. During the subsequent two seasons there was decline in landings with 86.9 t and 236.9 t at the catch rate of 2.00 and 4 kg. This species also formed about 2.5 to 4.9% of the total 'dol' net landings. November–December appears to be its peak period of abundance.

An estimated catch of 133, 49.7 and 147.5 t of *H. ensirostris* were landed during the three seasons at the catch rate of 3.6, 1.1 and 2.6kg respectively. It formed about 1.42% to 3.1% of the total catch. November–Decem-

Table 4. Catch composition of 'dol' net landings at Nawabunder during 1978-79

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	Total
Estimated effort (No. of haul)	920	6272	10791	9180	7920	4998	5608	8280	3003	56972
Catch in kg	172682	899417	849938	735720	303960	288412	392700	1015990	168870	4797689
Catch per effort in kg.	187.7	138.6	78.8	80	38.4	57.7	70	122.7	56.234	84.211
Fish:										
<i>H. nehereus</i>	160608	690400	577665	652800	66120	204600	131870	735525	71970	3291558
<i>C. dussumieri</i>	917	6474	8690	3720	48000	1233	163684	195757	14981	443456
<i>I. filigera</i>	462	6344	—	—	—	—	420	3542	49	10817
Other clupeid	—	—	—	—	—	—	—	—	—	—
<i>Trichiurus</i> spp	1907	24349	11561	3960	20160	5498	15808	56193	56193	144993
<i>P. diacanthus</i>	—	351	550	—	31200	3065	9950	11541	2576	59233
<i>M. telabonoides</i>	—	1164	—	—	6240	—	—	1320	751	9485
<i>T. argenteus</i>	238	—	3476	—	—	—	380	2829	—	6923
Elasmobranchs	—	1820	—	—	—	—	184	—	—	1820
<i>Tachysurus</i> spp.	210	910	—	—	—	—	—	1298	—	2602
Sciaenids	87	5876	5170	1248	—	—	1532	1465	—	15378
Prawn:										
<i>A. indicus</i>	1281	107309	12183	1842	91200	25336	25840	5698	98	270787
<i>N. tenuipes</i>	315	—	116259	7890	18000	42316	19740	17314	15030	236864
<i>H. ensirostris</i>	3846	18811	88847	28848	—	—	520	6490	98	147460
<i>S. crassicornis</i>	238	—	7607	25980	1200	800	10916	7489	2183	56413
Other penaeids	—	—	209	—	—	—	5676	8034	—	13919
Miscellaneous	2572	5610	17721	9432	21840	5564	6180	12131	4931	85981

Table 5. Depthwise catch composition of 'dol' net landings at Nawabunder during 1976-77 to 1978-79

No. of net Type of fishing craft and tonnage	1976-77			1977-78			1978-79		
	One Non- mecha- nised 2-5	Two Partly mecha- nised 5-12	Three Mostly mecha- nised 12&above	One Non- mecha- nised 2-5	Two Partly mecha- nised 5-12	Three Mostly mecha- nised 12 & above	One Non- mecha- nised 2-5	Two Partly mecha- nised 5-12	Three Mostly mecha- nised 12 & above
Depth in meter	20-25	25-31	31-36	20-25	25-31	31-36	20-25	25-31	31-36
Effort (No. of haul)	9553	11871	15684	9710	11674	22456	11447	28284	17231
Catch in kg.	1459808	1978455	3045644	841748	877307	1786562	991651	2276016	1530022
Catch per haul in kg	152.8	166.7	194.2	86.7	75	79.6	86.6	80	88.6
Species:									
<i>H. nehereus</i>	1172770	1426915	2100798	574054	699563	1416981	800225	1648912	842421
<i>M. dussumieri</i>	29041	33870	34440	37957	25933	58073	19682	130226	293548
<i>I. filigera</i>	4084	6456	8956	—	6424	5378	2722	6249	1846
<i>Trichirurus</i> spp	44289	77442	118005	72484	51260	102929	18718	54346	71929
<i>P. diacanthus</i>	2589	435	1848	—	2989	14885	3894	18907	36432
<i>M. telabonoides</i>	3720	54732	135012	532	112	4472	220	2060	7205
<i>P. argenteus</i>	5797	5420	11328	4360	3036	4523	1563	4800	560
Elasmobranchs	1346	1455	8699	—	144	797	—	—	1820
<i>Tachysurus</i> spp	1468	785	6423	—	—	—	—	87	2515
Sciaenids	1325	1120	35747	745	347	8784	—	210	15168
<i>A. indicus</i>	117176	258100	24242	37031	33483	6145	76058	116268	78461
<i>N. tenuipes</i>	7255	8800	269083	33374	24762	28737	26472	171866	38256
<i>H. ensirostris</i>	11608	4554	117181	34297	3164	12274	18195	71489	57776
<i>S. crassicornis</i>	33150	64620	7531	11980	6153	26183	9181	32484	14748
Other penaeids	10166	15482	135162	20479	6420	23958	4265	6230	3424
Miscellaneous	14924	19269	31189	14435	13517	73443	10456	11882	63643

ber appears to be its peak period of abundance.

Penaeid prawns

Solenocera crassicornis forms one of the most important penaeid prawns in 'dol' net landings. Estimated catch of 105.3, 44.3 and 56.4 t were landed during the three seasons at the catch rate of 2.8, 1 and 1 kg respectively forming about 1.18 to 1.62% of the catch.

Other penaeid prawns include mainly *Parapenaeopsis stylifera*, *P. hardwickii*, *P. sculptilis*, *Metapenaeus affinis*, *M. monoceros* and *M. kutchensis*. An estimated 160.8 t were landed at the catch rate of 4 kg during 1976-77. Subsequently there was reduction in the catch and catch rate which came down to 0.2 kg in 1978-79.

Miscellaneous fishes

This group includes, *Polynemus heptadactylus*, *Bregmaceros macellandi*, *Trypauchen vagina*, *Caranx* spp. flat fishes, squilla, crab, squid and cuttle fishes. Estimated catch of 65.4, 101.4 and 86 t of miscellaneous fishes were landed during 1976-77, 1977-78 and 1978-79 respectively at catch rate of 1.8, 2.3 and 1.5 kg. The catch rate is usually high in September-October.

Depth wise distribution of the species

Depth wise distribution of different species landed at Nawabunder are given in Table 5 along with tonnage of the fishing craft and number of nets in operation, in the respective areas and the catch rates of the different species are given in Fig. 2. It is evident that the highest catch rates were recorded from the depth range of 31-36 m, particularly of *C. dussumieri*, 'ghol', 'wam' and sciaenids and miscellaneous spp. The catch rates of *C. dussumieri* were 2.2-17 kg in 31-36 m zone compared to 1.7-3 kg in 20-25 m and 2.9-4.6 kg in 25-31 m depth range. The better catch rates (0.2-2.0 kg) of 'ghol' were also recorded from the 31-36 m zone than the other two regions. Similarly large quantities of 'wam' were also landed mainly from about 31-36 m depth. There are greater quantities of sciaenid resources in the 31-36 m region than the

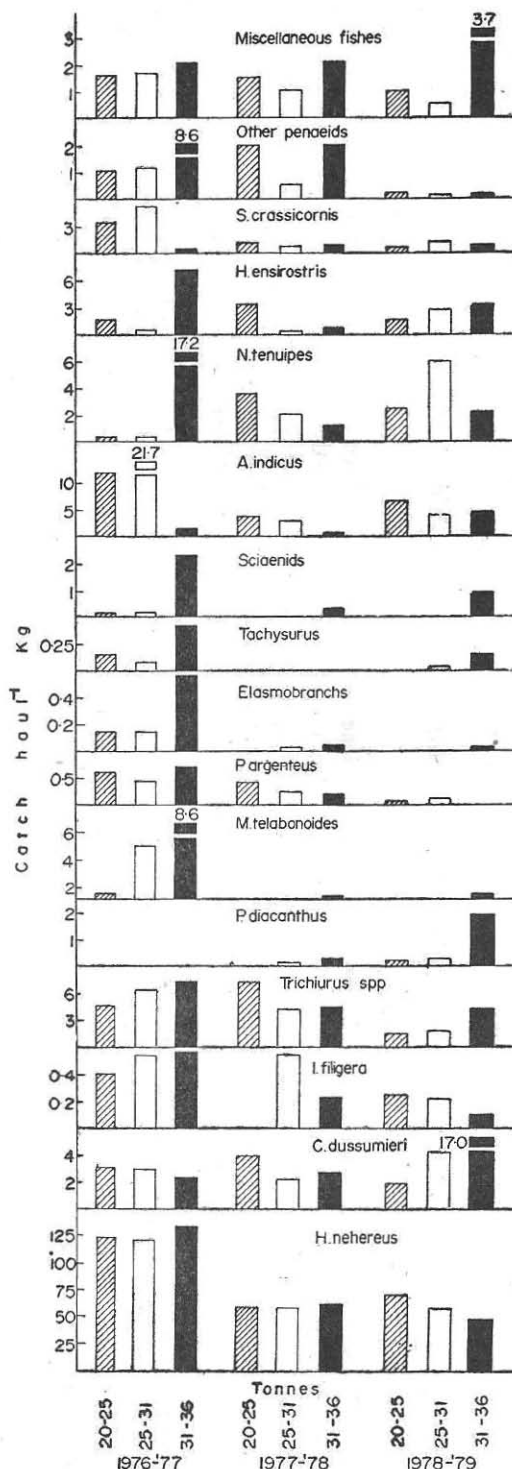


Fig. 2. Catch rate of different species of fish.

other two shallower regions. Miscellaneous fishes were also more in abundance in 31-36 m zone.

General remarks

It is evident from the data that there were increasing trend towards effort but declining trend of 'dol' net landings at Nawabunder particularly during 1977-78 when only 3505.6 t were landed compared to 6484.9 and 4797.7 t landed during 1976-77 and 1978-79. The effort has increased from 37,108 in 1976-77 to 56,972 hauls in 1978-79 fishing season. The catch rate has declined from 174.8 kg to 84.2 kg during the same period. The decline in landing appears to be mainly due to poor abundance of Bombay duck. In addition, poor landings of *Trichiurus* spp. 'wam', *A. crassicornis* were also evident. However, the landings of *C. dussumieri*, 'Ghol' showed improvement.

The data indicates that September-January is the most productive period except for *C. dussumieri* and 'ghol' which are more in abundance during February-March. The abundance of 'ghol' at the catch rate of 0.6-1.8 kg during February-May suggest that this area can sustain a profitable bottomset gill-net fishery for this particular species.

Depth-wise catch composition shows that the area between 31-36 m is comparatively more productive particularly for *C. dussumieri*, 'ghol', 'wam', scianoids and miscellaneous species.

Zafar Khan (1980) has observed that Bombay duck fishery at Nawabunder is essentially based on juveniles and percentage of adult fish is very low particularly during February-May (4.4%). He further reported the occurrence of large number of

juveniles of commercially important fishes namely, *P. argenteus*, *T. lepturus* and *I. filigera* particularly during February-May and suggested the need of appropriate regulatory measures to conserve young ones. The decline in the 'dol' net landings with increase in effort, indicate that the fishery is under heavy fishing pressure. In view of the occurrence of large number of young-ones of commercially important fishes there appears a need to regulate the 'dol' net fishery.

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